

-) Enhancement mode JFET d) has a p-type substrate
- viii) A dot near the transistor pin denotes
- a).emitter b).base
c).Collector d).None of the above
- ix) Transistor works as an open switch when emitter junction is.....biased and collector junction is.....biased
- a).Forward, reverse b).Reverse, reverse
c).Reverse, forward d).Forward, forward
- x) The majority carriers in case of NPN silicon transistor are
- a).Electrons b).Electron-hole pairs
c).Holes d).Impurity ions

1) Define

(5×2=10)

- Pinch off
- Reverse saturation current
- Surface inversion
- Zener breakdown
- MOS Capacitor

PART B

Answer any four Questions

(4×5=20)

- Define the term Power Amplifier.
- What do you mean by Ideal voltage amplifier?
- Draw the Darlington pair circuit and explain.
- What do you mean by the stability factor of a transistor circuit?
- What is the Purpose of feedback in an electronic circuit?
- Explain how oscillator generates an electronic signal?

PART C

Answer any Three Question

(3×10=30)

- for a given transistor $\beta_{dc} = 0.98$, $I_E = 2mA$. calculate β_{dc} and I_B .
- Define β_{dc} and β_{ac} also deduce the relation between β_{dc} and β_{ac} .
- Transistor is connected in common emitter configuration as an amplifier. The parameters of the transistor specified are: $I_B = 25\mu A$, $I_{CBO} = 100nA$, $\beta = 100$, Find I_C , I_E , α .
- Draw and explain the characteristics of JFET.
- A JFET has drain current of $15 mA$. If $I_{DSS} = 25mA$ and $V_P = 5V$, find V_{GS}
- Explain the working principle of WIEN Bridge oscillator.
- Explain Barkhausen criteria and also discuss the essential elements of an oscillator.
- Define h parameters for a BJT.
- What do you mean by noise and noise figure? Explain Thermal noise, shot noise and flicker noise.

ix) The depth of a complete binary tree is given by

a) $D_n = \log_2 n + 1$

b) $D_n = n \log_2 n + 1$

c) $D_n = \log_2 n$

d) $D_n = n \log_2 n$

x) The postfix form of $A*B+C/D$ is

a) $*AB/CD+$

b) $ABCD+/*$

c) $AB*CD/+$

d) $AB*CD/+$

B] Very Short Question

(5*2=10)

a) What is time complexity? Define Big-Oh notation.

b) What is a root node? Give example.

c) What is pre-order traversal of tree?

d) What is Hashing? Explain its use.

e) What is an AVL tree? Give example.

PART-B

Q.2 Answer any four:

(4*5=20)

i) Differentiate between directed and Undirected graph.

ii) What is overflow and underflow conditions? Where and why are they used?

iii) What is infix, prefix and postfix notation? Give example.

iv) Discuss about Divide-and-Conquer approach. Also give the time complexity for this approach.

v) Create binary search tree for the following elements (23, 32, 24, 36, 15, 12, 39, 2, 19).

vi) What is recursion? Write a program to display the use of recursion.

PART-C

Answer any three:

(3*10=30)

Q.3 Discuss about the comparative analysis of Array and Linked List with their types.

Q.4 What do you mean by Asymptotic Notation? Explain various notations in details.

Q.5 Write a program to perform Bubble sort of n elements. Also calculate its Worst case time complexity.

Q.6 Consider the following infix expression:

$$(7-5)*(9/2)$$

Perform prefix and postfix operations. Also represent its stack status.

Q.7 What is a Linked List? Explain its types? What are the shortcomings of Single Linked List and how are they resolved?

Q.8 What is breadth first search? Discuss about any one traversal algorithm for graph with example.



Subject: DATA STRUCTURES
Branch –CSE
Time:3Hours

B.TECH

Full Marks:70
Pass Marks: 28

- Candidates are required to give their answers in their own words as far as practicable.
- Question paper is divided into THREE PARTS- A ,B&C
- Part A is compulsory.
- Part Contains SIX questions out which FOUR are to be answered.
- Part C Contains SIX question out of which THREE are to be answered.

PART A

Q. 1) All questions are compulsory

A) Multiple choice Questions:

(10*1=10)

i) The result of evaluating the postfix expression $10\ 5\ +\ 60\ *8\ -$ is

- | | |
|--------|-------|
| a) 213 | b) 71 |
| c)142 | d)284 |

ii) In a stack insertion and deletion take place at

- | | |
|--|--|
| a) beginning | b) end |
| c) insertion at beginning, deletion at end | d) insertion at end, deletion at beginning |

iii) Which of the following is essential for converting an infix to postfix expression

- | | |
|----------------------|--------------------|
| a) an operator stack | b)an operand stack |
| c) both a) and b) | d) none |

iv) A binary search tree whose left sub tree and right sub tree differ in height by at most 1 unit is called

- | | |
|-------------------|--------------|
| a) Red black tree | b)Lemma tree |
| c)Binary tree | d)AVL tree |

v) Which of the following is non-linear data structure?

- | | |
|----------|----------------------|
| a) tree | b) Queue |
| c) stack | d) none of the above |

vi) The number of comparisons done by sequential search is

- | | |
|--------------|--------------|
| a) $(N/2)+1$ | b) $(N+1)/2$ |
| c) $(N-2)/2$ | d) $(N-1)/2$ |

vii) Linear arrays are also called.....

- | | |
|--------------------------|---------------------|
| a) Vertical array | b) queue |
| c) One dimensional array | d) horizontal array |

viii)The complexity of merge sort algorithm is

- | | |
|-------------|------------------|
| a) $O(n)$ | b) $O(\log n)$ |
| c) $O(n^2)$ | d) $O(n \log n)$ |

ix) The depth of a complete binary tree is given by

a) $D_n = \log_2 n + 1$

b) $D_n = n \log_2 n + 1$

c) $D_n = \log_2 n$

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PART-B

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i) Differentiate between directed and Undirected graph.

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iv) Discuss about Divide-and-Conquer approach. Also give the time complexity for this approach.

v) Create binary search tree for the following elements(23, 32, 24, 36, 15, 12, 39, 2,19).

vi) What is recursion? Write a program to display the use of recursion.

PART-C

Answer any three:

(3*10=30)

- Q.3 Discuss about the comparative analysis of Array and Linked List with their types.
- Q.4 What do you mean by Asymptotic Notation? Explain various notations in details.
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$$(7-5)*(9/2)$$

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- Q.8 What is breadth first search? Discuss about any one traversal algorithm for graph with example.



ARKA JAIN University, Jharkhand

3rd semester Final Examination – 2019-20

B.TECH

Subject: OOP
Branch – CSE
Time: 3 Hours

Full Marks: 70
Pass Marks: 28

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- Part C Contains SIX question out of which THREE are to be answered.

PART A

Q. 1) All questions are compulsory

A] Multiple choice Questions:

(10*1=10)

i) What is dynamic binding?

- a) The process of linking the actual code with a procedural call during run-time
- b) The process of linking the actual code with a procedural call during compile-time
- c) The process of linking the actual code with a procedural call at any-time
- d) all of them

ii) A copy constructor is called

- a) when an object is returned by value
- b) when an object is passed by value as an argument
- c) when compiler generates a temporary object
- d) all of the above

iii) Give output of the following:

class exam

```
{ private:  
    int x, y, z;  
  
public:  
    int testcase( ) {  
        x=50; y=20; z=30;  
    }  
}
```

friend int add(exam e);

vi) Write a program to display the concept of exception handling in C++.

PART-C

Answer any three:

(3*10=30)

Q.3 What is a pointer? Explain the types of pointers in C++. Write a program to display the use of 'this' pointer.

Q.4 Why do we need an array? Write down the syntax to declare various types of arrays? Write a program to display matrix addition.

Q.5 What is inheritance? Explain use of access specifiers in inheritance. Write a program to display the use of private access specifier in inheritance.

Q.6 What is a function? Differentiate between function overloading and overriding. Write a program to display function overriding.

Q.7 Write a menu driven program to calculate the maturity amount of a Bank Deposit as per the given options:

1. Term Deposit

2. Recurring Deposit

For option 1, accept principal (P), rate of interest (r), and time period in years (n). Calculate and print the maturity amount(A) using formula

$$A = P * [1 + r/100]^n$$

For option 2, accept monthly installment (P), rate of interest (r) and time period in months (n). Calculate the output maturity amount (A) using formula

$$A = P * n + P * [n(n+1)/2] * r/100 * 1/12$$

For every wrong input an error message must be declared.

Q.8 Write programs to display the patterns:

i.	HELLO	ii. 1 2 3 4 5
	HELL	5 1 2 3 4
	HEL	4 5 1 2 3
	HE	3 4 5 1 2
	H	2 3 4 5 1



ARKA JAIN University, Jharkhand

3rd Semester final Examination – 2019-20

Subject: Digital Electronics

Course: B.TECH(CSE)

Time : 3 Hours

Full Marks : 70

Pass Marks: 28

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- Question Paper is divided into **Three Parts –A, B & C**
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- **Part- C** contains **SIX** questions out of which **THREE** questions are to be answered

PART A

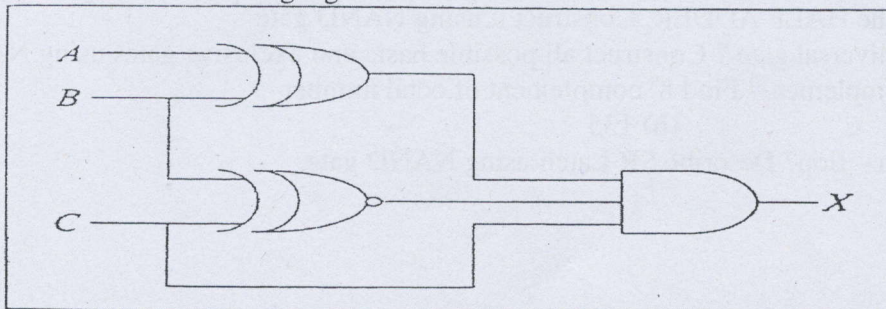
Q.1) All questions are compulsory

A] Multiple Choice Questions

(10x1=10)

- i) Which one of the following can be used as parallel to series converter?
- Decoder
 - Digital counter
 - Multiplexer
 - Demultiplexer
- ii) If the output of a logic gates is '1' when all its inputs are at logic '0', the gate is either
- A NAND or a NOR
 - An AND or an EX-NOR
 - An OR or a NAND
 - An EX-OR or an EX-NOR
- iii) A T- flip-flop function can be obtained from a JK flip- flop. If the flip- flop belongs to a TTL family, the connection needed at the input must be
- J=K=1
 - J=K=0
 - J=1 and K=0
 - J=0 and K=1
- iv) Convert binary number 1100.11 to decimal number
- 12.25
 - 12.75
 - 10.75
 - 11.25
- v) $(FE35)_{16}$ XOR $(CB15)_{16}$ Is equal to
- $(3320)_{16}$
 - $(FE35)_{16}$
 - $(FF50)_{16}$
 - $(3520)_{16}$

vi) Consider the following logic circuit:

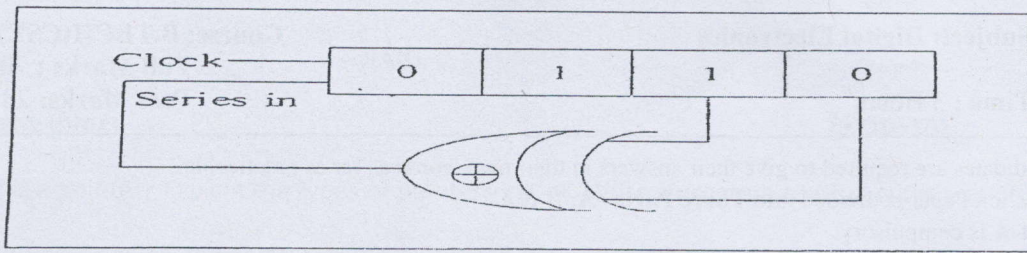


What is the required input condition (A,B,C) to make the output X=1, for the above logic circuit?

- (1,0,1)
- (0,0,1)
- (1,1,1)
- (0,1,1)

vii) Consider the following right shift register.

will The initial contents of the 4 bit serial-in parallel- out, shift right register shown below are 0110. What will be the contents of the register after 3 clock pulses are applied?



a.0000

b.0101

c.1010

d.1111

viii)What is the octal equivalent of decimal number 0.3125

a. 0.42

b. 0.3125

c. 0.24

d. 0.12

ix)F' s complement of $(2BFD)_{hex}$ is

a. E304

b. D403

c. D402

d.C403

x) The POS form of the Boolean expression $f(A,B,C) = \Sigma(0,1,4,5)$

a. $f(A,B,C) = \Pi(0,1,2)$

b. $f(A,B,C) = \Pi(2,3,6,7)$

c. $f(A,B,C) = \Pi(0,1,4,5)$

d. None of these

B] Very short answer type question

(5x2=10)

a)Draw the truth table of Ex-OR gate.

b)Write 2's complement of 0100.

c)Write the Dual of expression for $Y = A+B$

d)What is decimal equivalent of binary number 10100?

e) What is sequential circuit?

PART B

Q2.Answer any four:

(4x5=20)

- i) What is Multiplexer? Write expression for 2 x1 multiplexer.
- ii) Write the steps for solving K-map.
- iii) Describe the HALF ADDER. Construct it using NAND gate
- iv) What is universal gate ? Construct all possible basic and exclusive gates using NAND gate
- v) What r^s complement? Find 8^s complement of octal number
(a)457 (b) 135
- vi) What is flip – flop? Describe SR Latch using NAND gate.

PART C

Answer any three:

(3x10=30)

- Q.3)** Describe briefly about full subtractor.
- Q.4)** Write the following Boolean Expressions in Canonical SOP form and construct the K-map
- a. $Y=AB+BC+AB'C$
 - b. $Y=PQ+QR'+P'R$
- Q.5)** Convert the following Hexadecimal to Decimal number
- a) EACE
 - b) AAFÉ
 - c) ACE
 - d)EEE
 - e)DAD
- Q.6)** Describe briefly about JK-flip-flop.
- Q.7)** What is RTL in logic family? describe briefly.
- Q.8)** write a short notes on memories(RAM, ROM, EPROM,E²PROM).



Subject: Effective Technical Communication

Course: B. Tech. (CSE)

Time: 3 Hours

Full Marks: 70

Pass Marks: 28

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- **Part-A** is compulsory.
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PART A

Q.1) All questions are compulsory

A] Multiple Choice Questions:

(10x1=10)

- What is important about your voice in a telephonic conversation:
 - Volume
 - Speed
 - Tone
 - All of the above
- Which of the given statements is not included in writing essentials?
 - Style
 - Spelling
 - Words
 - Punctuation
- establishes the value of a technical report.
 - Logical conclusion
 - Illogical conclusion
 - Personal prejudice
 - Misplaced learning
- In technical writing, the most significant part of the report is termed as
 - Conclusion
 - Discussion
 - Heading
 - Footing
- We, us and our are some examples of:
 - Contractions
 - Pronoun usage
 - Name usage
 - Noun
- Which of these is not a parameter in report writing:
 - Extent of information
 - Quality of information
 - Age of writer
 - Ability to acquire information

- vii. The branch of philosophy that deals with the issues of right and wrong in human affairs is called:
- Linguistics
 - Ethics
 - Politics
 - Theology
- viii. An organised imagination around a certain theme or problem is known as :
- Fantasy
 - Dream
 - Image
 - Creative thinking
- ix. Which of the following things can have an effect on the development of individual personality:
- Physical and mental capability
 - Health and physical appearance
 - Skin colour and gender
 - All of the above
- x. Society always refers to the:
- Culture of the people
 - Interrelationship of the people
 - Mutual understanding of the people
 - Norms and values of the people

B] Very Short question

(5x2=10)

- What should be the main points in minutes of the meeting?
- Mention a few social etiquettes.
- What is collaborative writing?
- How would you define the attitude of a person?
- Mention a few important components of print media.

PART B

Q2. Answer any four:

(4x5=20)

- Discuss the effectiveness of graphic presentation.
- How is time management an important component of success?
- Briefly mention the role and responsibilities of a Computer Science engineer.
- Mention the important components of effective public speaking.
- How can a project proposal be drafted for best results?
- Write briefly on personality development.

PART C

Answer any three:

(3x10=30)

Q3. Write a letter to a social organisation with a request to take steps for promoting health care among mothers and their children.

Q4. Write an essay on any ONE of the following topics:

- a) Importance of computer in everyday life
- b) Modes of digital communication
- c) Role of digital media in shaping the society.
- d) Pros and cons of e-books.

Q5. Describe the effective and appropriate work culture in jobs.

Q6. Differentiate between perception and attitudes.

Q7. Write an event report on the welcome day "Aarambh" for the fresher's of B.Tech students of Arka Jain University.

Q8. Elaborate the importance of proper grammar in technical writing.



ARKA JAIN University, Jharkhand

3rd Semester Final Examination – 2019-20

Subject: Mathematics-3

Course: B tech

Full Marks: 70

Pass Marks: 28

Time : 3 Hours

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- **Part-D** is compulsory

PART A

Q1.) All questions are compulsory:-
A] Objective Answer Type

(5x1=5)

- i) $(D^2+DD'-6D^2)Z=\cos(2x+y)$ be
- a) $f_1(y-3x)+f_2(y+x)$
 - b) $f_1(y-x)+f_2(y+2x)$
 - c) $f_1(y-3x)+f_2(y+2x)$
 - d) none of these
- ii) One dimensional heat flow equation is given by
- a) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$
 - b) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial t^2}$
 - c) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial y^2}$
 - d) None of these
- iii) One dimensional wave equation is given by
- a) $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial y^2}$
 - b) $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$
 - c) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial t^2}$
 - d) None of these
- iv)) One of the methods to find out mode is
- a) Mode = 2median-3mean
 - b) Mode = 3median-2mean
 - c) Mode = 3median-2mean
 - d) None of these
- iv)) standard deviation is calculated on the basis of
- a) mean
 - b) median
 - c) mode
 - d) None of these

B] Short Answer Type**(5x2=10)**

- i) What do you mean by range?
- ii) What is meant by skewness? How is it measured?
- iii) Find the C.F of $(D^3 - 2D^2D')z = 2e^{2x}$
- iv) Two cards are drawn in succession from a pack of 52 cards find the chance that first is a king and second is a queen
- v) If the probability of new born child is a male is 0.6 .find the probability that in family of 5 children there are exactly 3 boys?
- vi) Define exponential distribution?

PART B**Q2.) Answer any four:****(4x5=20)**

- a) A random variable X has an exponential distribution function with pdf is given by $f(x)$
 - i. $F(x) = \begin{cases} 2e^{-2x} & \text{when } x > 0 \\ 0 & \text{when } x \leq 0 \end{cases}$
- b) Compute the probability that X is not less than 3 also find mean and standard deviation.
- c) The probability that a bomb dropped from a plane will strike the target is 1/5. If the six bombs are dropped. Find the probability that (i) exactly two will strike the target (ii) at least two will strike the target ?
- d) In a bolt factory machine A,B, and C ,manufactured 25%, 35% and 40% of the total of their output 5%,4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machine A?
- e) form the partial differential equation by eliminating the arbitrary function from a $z=f(x^2-y^2)$
- f) solve $py^3+qx^2=0$ by the method of separation of variables
- g) Solve $\frac{\partial^3 z}{\partial x^2 \partial y} = \cos(2x+3y)$ by direct integration method?

PART C**Answer any Three:****(3x10=30)**

- a) Form the partial differential equation by eliminating the arbitrary function of $F(x+y+z, x^2+y^2+z^2)$
- b) Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$ where $u(x,0)=6e^{-3}$
- c) solve $(x^2-y^2-z^2)p+2xyp=2xz$
- d) Solve $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ where c^2 is constant of diffusivity of material subject to the condition
- e) $U(0,t) = u(1,t) = 0$ and $u(x,0) = f(x)$ at $t=0$
- f) A tightly stretched string with fixed end points $x=0$ and $x=L$ in the shape defined by $y=kx(1-x)$
- g) Where k is constant is released from position of rest find $y(x,t)$ of the vertical displacement

$$\text{if } \frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2} ?$$

Q8.) Calculate the coefficient of correlation between birth rate and death rate from the following data:

Birth rate: 24 26 32 33 35 30

Death rate: 15 20 22 24 27 24

PART D

i) **Q9.)** From the following data compute arithmetic mean

Marks:	20-25	25-30	30-35	35-40	40-45	45-50	50-55
No of students:	8	10	12	20	11	4	5

(5x1=5)



ARKA JAIN University, Jharkhand

3rd Semester Final Examination– 2019-20

Subject: Effective Technical Communication

Course: B. Tech. (CSE)

Time: 3 Hours

Full Marks: 70

Pass Marks: 28

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Q.1) All questions are compulsory

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B] Very Short question

(5x2=10)

- What should be the main points in minutes of the meeting?
- Mention a few social etiquettes.
- What is collaborative writing?
- How would you define the attitude of a person?
- Mention a few important components of print media.

PART B

Q2. Answer any four:

(4x5=20)

- Discuss the effectiveness of graphic presentation.
- How is time management an important component of success?
- Briefly mention the role and responsibilities of a Computer Science engineer.
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